

The NASA New Millennium Program: Space Flight Validation of Advanced Technologies for Future Astronomy and Astrophysics Missions

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The NASA New Millennium Program (NMP) was established to identify breakthrough spacecraft and instrument technologies that are needed for future NASA space and Earth science missions, and to validate these technologies in space, if necessary, to reduce their inherent risk and/or cost for the first science user. For example, Deep Space 1 (DS1) validated a solar-powered ion propulsion system and 11 other advanced technologies. One of these technologies, the Small Deep Space Transponder, was adopted for use on SIRTf, and has been proposed on large numbers of SMEX, MIDEX, and Discovery missions. The Space Technology 5 (ST5) Nanosat Constellation Trailblazer Mission will deploy three, sophisticated, miniature (~22 kg) spacecraft in a highly elliptical orbit around the Earth. This NMP flight, which is currently scheduled for a 2003 launch, will validate 8 advanced spacecraft technologies that are needed for future large spacecraft constellations. These technologies may also enable a range of low-cost SMEX and UNEX missions.

These NMP missions provide a comprehensive, system-level validation of suites of interacting spacecraft and instrument technologies. While this approach provides the most efficient approach in many cases, other high-priority technologies could benefit from a more highly focused, stand-alone, subsystem validation in space. To insure the highest possible rate of technology infusion into future NASA missions, the NMP is therefore augmenting its existing line of system-level validation flights with a low-cost, quick-turnaround "subsystem mode". These flights will provide stand-alone validations of a range of payloads, from components to complete subsystems, employing on flights of opportunity.

This presentation provides a brief overview of the technologies validated by the NMP to date, and summarizes their potential benefits to the astronomy and astrophysics communities. We will then discuss the processes used to identify technologies as flight validation candidates, and describe the system and sub-system approaches for validating these technologies in space.